Chapter 8

SUMMARIZING THE INVESTIGATION

1) The Report
2) Purpose of The Report
3) Outbreak Report Format
4) Examples of Reports

SUMMARIZING THE INVESTIGATION

Introduction
When an investigation is complete, the final responsibility is to provide written documentation of events. This is necessary not only for large outbreaks involving many people but also for single complaints of possible foodborne illness. This chapter explains the importance of the report and its possible uses. Also included is a detailed explanation of a workable format for writing a report, what should be included in the report and who should receive it. Finally, samples of outbreak reports of differing complexity are included as a guide.

While this chapter focuses on a report written for a more complex outbreak, even single complaints should be documented as completely as possible. The single complaint must always be regarded as the possible first indication of a larger problem.

1) The Report

The report documents what happened in a foodborne illness investigation. It is public record and must be objective, accurate, clear, and timely.

Detail in the document should reflect the complexity of the incident under investigation. A single complaint might result in a "complaint form" (e.g., the *Foodborne Illness Complaint Worksheet)* being completed with a list of action steps and any follow-up. (See Chapter 4, Section 4-A for more information on the *Foodborne Illness Complaint Worksheet*.)

A more complicated occurrence (i.e., a large outbreak) might involve people outside your local jurisdiction and require a more comprehensive report. It may be necessary to enlist all involved parties when writing a final report. It is the responsibility of the local board of health (LBOH), however, to recruit state agency personnel or others to assist in completion of the report.

2) Purpose of the Report

Whether the report is being written in response to an outbreak or a single complaint, complete documentation is important for the following reasons:

A document for action.

In some cases, control and prevention measures will only be instituted in response to a written report. Until an outbreak is documented and summarized in a formal "outbreak report," it is easy for the implicated establishment operator to shift responsibility. The document contains the "official" findings. It should be used in refuting rumors and speculation.

A record of performance.

A well-written report documents the magnitude of health problems and justifies program activities. A report clearly states events that occurred and the process that was followed. It should include all steps undertaken by everyone involved. The person writing the report will need to gather that information. The comprehensiveness of the outbreak report should reflect the complexity of the investigation. This accurately documents events and also clearly illustrates staffing resources required to undertake the investigations.

A document for potential legal issues.

An investigative report written by health professionals must be written objectively, honestly and fairly. Information in these investigations is frequently used in legal actions. Thus, it is very important that a record exists that accurately documents events in a timely manner to aid in any legal investigations that might ensue.

An enhancement of the quality of the investigation.

The process of writing a report and viewing the data in written form may result in new insights. It could precipitate new questions to be answered before a conclusion is reached. The more investigations and outbreaks one writes up, the better the understanding of process and results.

An instrument to present control and preventive measures.

The primary reason to undertake an investigation is to control and prevent disease. The written report is an official medium to present control and preventive measures, and perform needs assessments. One may identify new trends, introduce new regulations or policies, identify training needs and reinforce existing regulations. When the report is presented to the owners and managers, encourage them to use it as a catalyst for change. This document is an educational tool and may help to prevent the same problems from reoccurring. (For example, operators who have been educated about the availability and safety of a pasteurized egg product will probably choose that over pooled whole, shell eggs.)

3) Outbreak Report Format

There are a variety of ways to compile the information obtained during an investigation into a professional, understandable and usable document. Below is the standard outline used by the Massachusetts Department of Public Health (MDPH) to write an outbreak report. The MDPH staff usually follow this format because it logically describes the events that occur during an investigation.

NOTE: This format can be modified to reflect the complexity of the outbreak.

NOTE: Three outbreak report examples (8.1, 8.2, and 8.3) are provided at the end of this chapter. Please note the varying complexity of each report.

Even if you do not get the opportunity to compile a complex "outbreak report," you might be the recipient of one if a large outbreak occurs in your jurisdiction. It would be helpful for you to be familiar with the following format and understand what information is contained in each section. It will then be easier for you to adopt any or all of the sections for use when responding to and documenting smaller scale incidents.

A foodborne illness outbreak report should include the following sections:

I. Summary
II. Introduction
III. Background
IV. Methods
- **A) Epidemiologic**
- **B) Environmental**
- **C) Laboratory and Clinical**

V. Results
- **A) Epidemiologic**
- **B) Environmental**
- **C) Laboratory and Clinical**

VI. Discussion
VII. Recommendations
VIII. Acknowledgments
IX. Supporting Documentation

I. Summary

The summary should consist of a paragraph or two that provide the reader with an overview of the investigation (i.e., the WHO, WHAT, WHERE and WHEN of the outbreak). It should describe what caused the outbreak or the causal hypothesis based on the evidence.

II. Introduction

Include the specific events that led to the investigation. Include:
1) how the outbreak was first reported,
2) steps undertaken to confirm its existence, and
3) all who assisted in the investigation.

III. Background

Background information is important. This section identifies the type of establishment involved in the outbreak (e.g., take-out restaurant, banquet facility, caterer, fast food establishment, retail store). Also include whether the establishment is part of a national chain, a commissary, a dormitory or a buffet where attendees are likely to eat multiple foods. In this section discuss the capacity of the food service operation, which may help to determine the possible extent of the outbreak.

IV. Methods

A. Epidemiologic

Explain how cases were defined. For example, even if you are investigating an outbreak of salmonella you are probably not confining yourself to only laboratory confirmed cases. Does a case have to experience diarrhea or is abdominal cramping sufficient? The issues should be determined and explained in detail. Also describe how cases became known, questions you asked, and how asked. Include descriptions of interview techniques and copies of questionnaires or surveys if used.

B. Environmental

Clearly outline the number and kinds of environmental investigations that occurred and who conducted them. Was a HACCP risk assessment conducted of suspect foods as well as physical facility inspections? Were there any tracebacks of food products?

C. Laboratory and Clinical

Discuss any analyses performed. It is important to note what kinds of and how many specimens were submitted for laboratory analysis. Was food available for testing? Did cases submit stool specimens or other clinical specimens for analysis? Were food handlers required to submit stool samples for testing? Note where the specimens were sent, what kinds of analyses were performed and who completed the testing. This could involve private, state or federal laboratories.

V. Results

In the previous section you outlined what steps you took to investigate the outbreak. This section is where you tell your readers what you discovered. These results can be presented in tables, graphic figures and/or text:

A. Epidemiologic

- number of questionnaires mailed and returned
- number of people fitting the case definition

- symptoms experienced by cases
- duration of symptoms
- incubation period
- food or meal-specific attack rates
- statistical significance of foods eaten
- epidemic curve of the outbreak
- relationships among cases (if any)

B. Environmental

- results of any HACCP risk assessments conducted
- the results of the physical facilities inspection (e.g., violations noted)
- the results of any food tracebacks

C. Laboratory and Clinical

- culture or other laboratory results on food handlers, patrons, or other individuals connected to the outbreak
- results on foods tested

VI. Discussion

This section is where all aspects of the investigation are brought together and a conclusion is drawn.

NOTE: Not all outbreaks have a resolution. In fact, it is rare when everything comes together and a cause can be definitively determined. Do not be discouraged. In most cases, there will be enough evidence to present a plausible hypothesis (see Chapter 6, Section 3). Be clear and present a detailed explanation on what has contributed to the conclusion.

VII. Recommendations

This is the opportunity to educate. Be detailed because these recommendations hopefully will be read by many people in the establishment that was investigated. The establishment has a vested interest in following the suggestions. If the outbreak has been large and disruptive, the establishment will not want it to reoccur. In addition to listing general recommendations on good food handling procedures, include specific recommendations that address what might have been overlooked in the particular outbreak (e.g., attempting to transport food long distances at inadequate temperatures).

VIII. Acknowledgments

In the spirit of cooperation, it is proper to thank those who assisted in the investigation. This might include health care personnel, the food handlers and/or management of the establishment or other local or state officials.

IX. Supporting Documentation

When compiling the report, attach copies of all items that are relevant. These would include the following:

- inspection reports
- blank samples of the surveys or questionnaires
- letters to management
- menus
- copies of posted notices
- food testing results
- foodborne illness worksheet(s) (without names or other personal identifiers)

When compiling material, be aware of confidentiality issues (see Chapter 4, Section 5). **Information that can lead to the identification of individual cases (e.g., test results that include personal identifiers), should not be included in the outbreak report.** The name of the establishment under question is part of the public record and can be disclosed. Data that *cannot* be used to identify individuals can be presented. People cooperate in investigations on the basis of protected confidentiality, and this should be respected.

Distributing the Report

Copies of the report should be made available to all parties involved in the investigation. This would include, but not be limited to, the owner and/or managers of the establishment, the MDPH, and any other local or state agencies affected by or involved in the outbreak or the investigation.

4) Examples of Reports

Three examples of outbreak reports are provided at the end of this chapter (Examples 8.1, 8.2 and 8.3).

Example 8.1 - This sample report summarizes a situation that occurred in which two different types of salmonella were reported in patrons who ate at a specific establishment. This report is not as comprehensive as Example 8.3. The association of illness with this establishment was subtle. The response in this case was abbreviated. However, it is still necessary to document the events that took place during the course of the investigation.

Example 8.2 - This sample report summarizes an event-associated outbreak of salmonellosis that occurred in a private home. This report is also not as comprehensive as Example 8.3. The investigation consisted of a HACCP risk assessment along with food and stool sample submission. The stool and food samples (lasagna and chicken) both tested positive for *atypical Salmonella enteritidis*. The findings of the HACCP risk assessment suggest contamination of lasagna and possibly chicken. The findings of this investigation illustrate that outbreaks of *Salmonella enteritidis* are a public health problem

in homes as well as food-service establishments. It is important to encourage participation in investigations of home outbreaks and document events that took place.

Example 8.3 - This sample is a report summarizing the investigation of a large point-source outbreak of an unidentified gastrointestinal illness that occurred at a wedding. This investigation included the use of questionnaires and data analysis to identify a suspect food item. In an outbreak of this magnitude, it is important to be as complete as possible because years later one could be asked to provide information on the investigation.

Foodborne Illness Complaint Worksheet. Another type of report would be a completed *Foodborne Illness Complaint Worksheet.* In some situations, a follow-up investigation of a complaint may not be warranted or minimal follow-up may be sufficient (e.g., complaints involving one person or for complaints where it is obvious that the symptoms or diagnosis are clearly unrelated to the food which the complainant believes to be causal and no other information is available). Documentation can consist of a completed *Foodborne Illness Complaint Worksheet* with an inspection report attached, if applicable. This form comprises the entire "report." If no violations were noted during the environmental inspection and no other complaints about the establishment were received, close the investigation. (More information on the *Foodborne Illness Complaint Worksheet* can be found in Chapter 4, Section 4-A.)

References

Bryan, F. *Guide for Investigating Foodborne Disease Outbreaks and Surveillance Data,* U.S. Department of Health and Human Services, CDC. Atlanta, Georgia, 1981.

Holland, W. et al. *Oxford Textbook of Public Health*, Oxford University Press, 1985; 3: 284-289.

EXAMPLE 8.1
OUTBREAK REPORT

MEMORANDUM

To: The File

From: [Writer of the Report]

Date: January 2, 1996

Re: Outbreak of *Salmonella tyvar-copenhagen* and *atypical Salmonella enteritidis* among patrons of Restaurant X during the month of September, 1995.

I. Summary

On November 16, 1995, the Division of Epidemiology of the Massachusetts Department of Public Health (MDPH) was notified by a resident of Town Y who had been confirmed with *Salmonella tyvar copenhagen* that she and a friend had eaten at Restaurant X on September 9, 1995 and had become sick on September 10th and 11th respectively. Upon further investigation of *Salmonella tyvar copenhagen* cases reported to the bacteriology lab of the State Lab Institute (SLI) during September and October, 1995, nine other cases were reported in the vicinity of Town Y, including four from a nearby town of only 3,000 people. Eight of these cases were eventually contacted, and all reported eating at Restaurant X previous to their illness with six reporting eating there in the two to three days before their illness. An additional case was identified from a complaint received from a resident of a distant town who had eaten at the restaurant in September and was later diagnosed with *S. tyvar-copenhagen*. Illness onset dates ranged from September 6 to September 25. A secondary case had an onset date of October 5. The cases ate a variety of food items including chicken, French toast, soup, salad, and a cheese steak sandwich. Seventeen food handlers submitted stool samples during December. All tested negative, but it was almost three months after the outbreak. There were, however, anecdotal reports of two food handlers being ill during the month of September.

IV and V Methods and Results

A. Epidemiologic

Attempts were made to contact all *S. tyvar-copenhagen* cases reported to the MDPH during September and October 1995. Eleven cases were reported in the vicinity of

Town Y, two of which had been the original complainants. Eight of the remaining nine cases had reported eating at Restaurant X previous to their illness. They had eaten a variety of foods on different days. The ninth case was unable to be contacted but an additional case was identified from a complaint received from a resident of a geographically distant town who was later diagnosed with *S. tyvar-copenhagen*. The Town Y health agent reported that there had been another separate complaint against the restaurant in September which involved a father and daughter, both of whom were ill, although only the daughter was confirmed with *atypical Salmonella enteritidis.* There were no other atypical *Salmonella enteritidis* cases reported to the SLI in the area of Town Y involving Restaurant X.

B. Environmental

The Food Protection Program (FPP) inspected the restaurant on November 20, 1995. The following deficiencies were noted: no hand washing sink with soap and paper towels in the kitchen, poor lighting in walk-ins, chowder cooling in four gallon pails, and no light shields in side preparation area. FPP reviewed various aspects of food temperatures, handling, storage, preparation, hygiene, and sanitizing. FPP did not observe any food preparation since the inspection occurred between meal times (See Attachment 1).

C. Laboratory

No food items were available for testing. Seventeen food handlers submitted negative stool samples during December.

VI Discussion

There appeared to be eleven cases of *S. tyvar-copenhagen* associated with Restaurant X during the month of September, 1995. These cases did not eat a common food item and did not eat on a common day. This supports the theory that contamination occurred in the restaurant. This contamination could have occurred as a result of poor food handling among *Salmonella*-infected food handlers or contamination of environmental surfaces by *Salmonella*-infected food items. The inspection report mentions no hand washing sink in the kitchen. The food handlers who submitted stool specimens tested negative, but this was two to three months after the outbreak, ample time for the *Salmonella* bacteria to be completely cleared from the stool of a previously infected person.

VII. Recommendations

1) To prevent outbreaks, efforts should be directed at optimizing conditions for sanitation, preventing contamination of foods or water, and cleaning environmental surfaces that may be at risk for contamination.

2) Any food handler who experiences any type of gastrointestinal illness must report it to a supervisor and must refrain from participating in foodhandling activities. Food handlers should be aware of the importance of good hygiene in preventing the spread of foodborne illness. Handwashing should be done frequently, especially after toilet use.

3) All foods to be served to the public should be stored and prepared in a facility specifically for that purpose.

4) Potentially hazardous foods which contain poultry and/or poultry products shall be cooked to an internal temperature of at least 165^0F.

5) Potentially hazardous foods should be transported and held at suitable temperatures, if hot, at > 140^0F, if cold, at < 45^0F.

6) Potentially hazardous foods should be prepared as close to service time as possible. Advance preparation should be discouraged.

7) Food that will not be cooked before serving should be handled using a utensil or wearing gloves.

EXAMPLE 8.2
OUTBREAK REPORT

MEMORANDUM

To: The File

From: [Writer of the Report]

Date: February 6, 1996

Re: Outbreak of *atypical Salmonella Enteritidis* at a Private Home in XXXXX, MA on December 24, 1995.

Introduction:

On December 26, 1995, the Division of Epidemiology was notified by the XXXXX Board of Health that 11 out of 25 people who attended a private family holiday dinner in Town X during the late afternoon of December 24 had become ill with nausea, diarrhea, abdominal cramps, and fever the next day. All of the ill people were reported to have eaten lasagna at the dinner party. Other food items at the dinner included eggplant parmesan, chicken, and antipasto. The lasagna had been prepared at home by a resident of Town Y who initially contacted the board of health.

Food Preparation:

The Food Protection Program (FPP) reviewed the preparation process (HACCP risk assessment) for the lasagna with the resident. Eight shelled eggs were mixed with ricotta cheese during the preparation process. The lasagna was refrigerated overnight at the resident's house. It was transported to Town X in an unrefrigerated car for 20 minutes and then left out on a porch, unrefrigerated, for approximately two hours. The lasagna was then put in a preheated oven at 350^0F for approximately 30 minutes. Finally, the cooked lasagna was left out on a table at room temperature for more than two hours. Please refer to attachment 1 for more details.

Laboratory Results:

Eleven ill guests of the holiday dinner submitted stool specimens which tested positive for *atypical Salmonella enteritidis*. The guests of the

party were never queried as to their food history at the party, but anecdotal reports indicated that all the ill people ate the lasagna. A sample of the lasagna and chicken from the party were transported to the State Lab Institute (SLI) for analysis. Both food items had violative standard plate count levels (2,500,000 for the lasagna and 190,000 for the cooked chicken) and tested positive for *atypical Salmonella enteritidis*. Please refer to attachment 2 for more details.

Conclusions:

Lasagna appears to be the food item which caused this Salmonella outbreak based on the information that all ill people apparently ate the lasagna, both the lasagna and ill people tested positive for *atypical Salmonella enteritidis,* and the lasagna, which was prepared with raw eggs, did not appear to have been cooked long enough to sufficiently kill the Salmonella bacteria. The chicken also tested positive for Salmonella, but both leftover the leftover chicken and the leftover lasagna had been submitted in the same container where cross contamination could have occurred. Since no specific food histories were obtained from the guests at the party, no food item could be statistically implicated in this outbreak.

EXAMPLE 8.3
OUTBREAK REPORT

MEMORANDUM

To: The File

From: [Report Writer]

Date: January 27, 1996

Re: Outbreak of Gastrointestinal illness at a wedding reception at Restaurant X, Town Y, MA on October 14, 1995.

I. Summary

An outbreak of gastrointestinal illness began October 15, 1995 among attendees of a wedding reception held at Restaurant X in Town Y, MA. Approximately 140 people attended the reception. Of 76 attendees who responded to a questionnaire, 41 (54%) fit the case definition. Epidemiologic analysis of the questionnaires indicated that illness was primarily associated with the consumption of gravy and stuffed turkey. An evaluation of procedures used to prepare reception foods identified improper cooling, storage, and reheating techniques which could have resulted in time-temperature abuse of both gravy and stuffing, and cross-contamination of turkey. Neither food nor clinical specimens were available for testing. Clinical, epidemiologic, and environmental evidence suggests that this outbreak occurred as a result of consumption of gravy and/or stuffed turkey contaminated with *Clostridium perfringens* or *Bacillus cereus*.

II. Introduction

On November 2, 1995, the Food Protection Program (FPP) of the Massachusetts Department of Public Health (MDPH) was notified by the Town Y Board of Health (BOH) of sixty-six of approximately 140 attendees of a wedding reception who became ill with abdominal cramps and diarrhea. The reception was held at Restaurant X in Town Y, MA on 10/14/95. The majority of ill attendees reported an onset of symptoms during the morning of 10/15/95. The reception consisted of appetizers (chicken fingers, cheese and crackers, bacon squares, deviled eggs, and stuffed celery) and a sit-down dinner including stuffed turkey, gravy, mashed potatoes, corn, cranberry sauce, rolls, salad, and cake. Beverages included home made hard apple cider. In response to the initial report, the MDPH Working Group on Foodborne Illness Control (WGFIC) initiated an investigation in cooperation with the Town Y BOH.

III. Background

Restaurant X, located in Town Y, MA, is a large restaurant including a banquet and conference room. Up to 225 patrons can be accommodated in a banquet setting.

IV. Methods

A. Epidemiologic

A case was preliminarily defined as any person who attended the wedding reception on October 14 (or ate leftovers from the reception) and who had onset of abdominal cramps, diarrhea, nausea, or vomiting during the next seven days. This definition was subsequently narrowed to only include those who had onset of symptoms within three days of the reception.

One hundred thirty-eight questionnaires regarding symptomatology, medical care, and food item consumption history were sent to a list of reception attendees obtained from the Town Y BOH (Attachment 1). Completed questionnaires were entered into a database analysis system (EPI INFO, Version 6.02). Descriptive case statistics were calculated and a retrospective cohort analysis was performed.

B. Environmental

An on-site investigation was conducted by the Town Y BOH at Restaurant X on November 2, 1995, in which procedures used in the preparation of foods served at the function were reviewed. The groom was interviewed by the Food Protection Program regarding procedures he used to manufacture hard cider served at the reception.

V. Results

A. Epidemiologic

Of 138 questionnaires sent out, 78 (57%) were received. Seventy-six of the 78 were completed and used in data analysis. Forty-one of the 76 respondents fit the case definition.

Descriptive analyses of the cases revealed that 21 (51%) were female and that ages ranged from 20 to 77 with a median age of 41 years. The incubation period between food consumption and illness ranged from two to fifty-eight hours with a median time of 12 hours (Table 1). Major case symptoms included diarrhea (93%), abdominal cramping (73%), nausea (37%), and fatigue (24%). Fever and vomiting were very infrequent and no bloody stools were reported by the cases

(Table 2). Medical care was sought by one case. The reported duration of illness ranged from 2 hours to 10 days, with a median of 24 hours and most frequently reported duration of 48 hours (24%) (Table 1).

The epidemic curve shown in Figure 1 suggests that this outbreak occurred after the reception attendees were exposed to a common source. A retrospective cohort analysis of completed questionnaires indicates that the consumption of each of five items, including turkey, stuffing, gravy, corn, and ranch dressing, was statistically associated with illness (Table 3). All cases consumed turkey (estimated risk ratio [RR] = 10.83, 95% confidence[CI] = Undefined, p-value = 0.001), stuffing ([RR] = 8.18, [CI] = Undefined, p-value = 0.007), and gravy ([RR] = 10.83, [CI] = Undefined, p-value = 0.001). The observed association with illness for both corn and ranch dressing consumption is likely confounded by stuffed turkey or gravy consumption. Due to low cell counts, however, stratification did not reveal further meaningful statistics.

Food and beverage consumption dose data was obtained for most items listed on the questionnaire. Results from a chi square analysis for trend indicated that the reported quantity of turkey, stuffing, and gravy consumed was linearly associated with illness (Table 4).

B. Environmental

The following high risk factors were revealed during the environmental investigation of Restaurant X by the Town Y BOH combined with subsequent follow-up by the Food Protection Program: 1) Stuffing made with sautéed onions, celery, butter, bread crumbs, and seasoning may have been prepared the day before service. Hot stuffing prepared ahead of time was placed in five-gallon plastic containers, covered with saran wrap, and placed in the walk-in refrigerator overnight. This may have resulted in improper cooling; 2) Seven gallons of gravy consisting of chicken stock, flour, and butter was prepared at noon the day before service, covered, and stored overnight in two five gallon plastic buckets, possibly delaying cooling and allowing the growth of vegetative bacterial cells. The gravy was then reheated in a double boiler prior to service. Lower cooking temperatures and/or shorter cooking time in the double boiler may have been insufficient to destroy vegetative cells present. Thermometers were not used by the establishment to monitor cooking and cooling temperatures; 3) Raw beef was stored over cooked food products which may have resulted in cross-contamination. No other significant findings were noted relative to the preparation of foods or to employee health and hygiene (Attachments 2 and 3).

A Hazard Analysis Critical Control Point (HACCP) evaluation of the hard cider preparation was conducted by the Food Protection Program, but no high risk factors were revealed. The hard cider was a fermented alcoholic beverage made with fresh cider from an approved source, yeast, sugar, and maple syrup. The

cider was fermented with carbon dioxide and aged for approximately two and one-half years.

VI. Discussion

The gastrointestinal illness observed in this outbreak was characterized primarily by diarrhea, abdominal cramps, and nausea, with very little vomiting or fever reported. The median incubation and duration periods were calculated as 12 and 24 hours respectively. These clinical features closely resemble those of both *Clostridium perfringens* and long incubation *Bacillus cereus* infections, although a viral or other bacterial etiology remains possible.

Epidemiologic analysis of food consumption histories obtained from questionnaires suggests that the consumption of gravy and/or stuffed turkey was most significantly associated with illness. These findings are supported by environmental evidence indicating that improper cooling procedures for both stuffing and gravy could have resulted in the growth of bacterial organisms. In addition, the subsequent reheating of gravy may not have destroyed any bacteria present, following cooling. Corn and ranch dressing consumption, shown to have a weaker association with illness, are more likely associated with the consumption of stuffed turkey or gravy. No violative procedures were noted regarding the preparation of corn or ranch dressing.

Homemade hard cider was a suspect item along with the foods and beverages prepared by Restaurant X. No epidemiologic association was found between hard cider consumption and illness. While there have been cases of mycotoxin contamination of apple juice, hard cider has not been identified as a common vehicle in foodborne illness outbreaks.

Gravy prepared from meat stock in cafeteria, restaurant, or institutional settings (large volume) is one of the most frequently implicated foods in *Clostridium perfringens* outbreaks. Heat-resistant spores may survive initial cooking. During slow cooling processes, spores can germinate and multiply to levels high enough to cause illness. Inadequate reheating (at temperatures less than 165^0F) can result in failure to kill the bacteria present.

VII. Recommendations

1. Prepare potentially hazardous foods as close to service time as possible.

2. Rapidly cool hazardous foods to 45^0F within 4 hours. Use shallow containers or icebaths to facilitate rapid cooling. Stainless steel containers rather than plastic are recommended for cooling. Loosely wrap the containers while cooling to allow for air circulation and refrigerate foods to be cooled immediately. Use food stem-type

thermometers to monitor temperatures while cooling.

3. Reheat foods to 165^0F within one hour. Use a thermometer to measure temperature after reheating.

VIII. Acknowledgments

The MDPH Working Group on Foodborne Illness Control thanks the Town Y Board of Health for their participation and assistance in this investigation. In addition, Restaurant X and the wedding reception organizers are thanked for their cooperation.

TABLE 1.
INCUBATION PERIOD AND DURATION OF ILLNESS
GI Outbreak, Town Y, MA - October 1995

INCUBATION PERIOD (HOURS)
n = 41

RANGE	2-58
MEAN	12.9
MEDIAN	12
SD	8.4

DURATION OF ILLNESS (HOURS)
n =41

RANGE	2-240
MEAN	34.8
MEDIAN	24
MODE	48
SD	39.7

TABLE 2.
SYMPTOMS OF CASES (n = 41)
GI Outbreak, Town Y, MA - October 1995

SYMPTOM	NUMBER (PERCENT)
Diarrhea	38 (92.7%)
Bloody	0 (0%)
Abdominal Cramps	30 (73.2%)
Nausea	15 (36.6%)
Fatigue	10 (24.4%)
Loss of Appetite	7 (17.1%)
Headache	6 (14.6%)
Muscle Aches	4 (9.8%)
Vomiting	3 (7.3%)
Chills	3 (7.3%)
Dizziness	2 (4.9%)
Fever	1 (2.4%)

TABLE 3.
ATTACK RATE BY FOOD CONSUMED
GI Illness, Town Y, MA - October 1995

		Attack Rates				
		Exposed	Unexposed			
Food Item	**Total Exposed**			**Risk Ratio**	**95% C.I.**	**p-value ***
Turkey	68	60%	0%	10.83 ***	Undef	0.001 **
Stuffing	70	59%	0%	8.18 ***	Undef	0.007 **
Gravy	68	60%	0%	10.83 ***	Undef	0.001 **
Mashed Potatoes	69	57%	29%	1.98	0.60, 6.5	0.238 **
Corn	62	61%	21%	2.86	1.03, 7.95	0.016
Cranberry Sauce	47	57%	48%	1.19	0.76, 1.87	0.588
Rolls	47	57%	48%	1.19	0.76, 1.87	0.588
Butter	53	57%	48%	1.18	0.73, 1.93	0.649
Salad	60	55%	50%	1.1	0.64, 1.89	0.941
Italian Dressing	28	43%	60%	0.71	0.44, 1.15	0.214
Ranch Dressing	32	69%	43%	1.59	1.05, 2.40	0.048
Chicken Fingers	3	67%	53%	1.25	0.55, 2.86	1.000 **
Bacon Squares	14	43%	57%	0.76	0.40, 1.44	0.532
Deviled Eggs	19	63%	51%	1.24	0.81, 1.90	0.506
Stuffed Celery	27	44%	59%	0.75	0.46, 1.22	0.321
Crackers	40	55%	53%	1.04	0.69, 1.58	0.971
Cheese	37	51%	56%	0.91	0.60, 1.38	0.832
Water	52	52%	58%	0.89	0.58, 1.36	0.784
Ice	46	54%	53%	1.02	0.66, 1.56	0.882
Hard Cider	25	60%	51%	1.18	0.77, 1.79	0.62
Beer	25	48%	57%	0.84	0.53, 1.35	0.629
Wine	14	71%	50%	1.43	0.94, 2.16	0.248
Coffee	41	46%	63%	0.74	0.49, 1.12	0.227
Cake	38	61%	47%	1.28	0.84, 1.95	0.357

* Yates Corrected unless otherwise noted
** Fisher's Exact (2-sided)
*** Risk Ratio Estimate (0.5 added to each cell)

TABLE 4.
CHI SQUARE ANALYSIS FOR TREND
(Turkey, Stuffing, and Gravy Consumption)
GI Outbreak, Town Y, MA - October 1995

Turkey Consumption

Amount Consumed	Attack Rate	p-value
None	0%	0.00007 *
Some	31.6%	
All	71.4%	

Stuffing Consumption

Amount Consumed	Attack Rate	p-value
None	0%	0.007 *
Some	30%	
All	70%	

Gravy Consumption

Amount Consumed	Attack Rate	p-value
None	0%	0.00006 *
Some	33.3%	
All	72.3%	

*Mantel Extension

Figure 1 - Epidemic Curve